

Metric System Basics

Metric System

- The metric system is based on a base unit that corresponds to a certain kind of measurement
 - Length = meter
 - Volume = liter
 - Weight (Mass) = gram
- Prefixes plus base units make up the metric system
 - Example:
 - Centi + meter = Centimeter
 - Kilo + liter = Kiloliter

Metric System

- The three prefixes that we will use the most are:
 - kilo
 - centi
 - milli

kilo	hecto	deca	<u>Base Units</u> meter gram liter	deci	centi	milli
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Metric System

- So if you needed to measure length you would choose **meter** as your base unit
 - Length of a tree branch
 - 1.5 meters
 - Length of a room
 - 5 meters
 - Length of a ball of twine stretched out
 - 25 meters

Metric System

- But what if you need to measure a longer distance, like from your house to school?
 - Let's say you live approximately 10 miles from school
 - 10 miles = 16093 meters
 - 16093 is a big number, but what if you could add a **prefix** onto the base unit to make it easier to manage:
 - 16093 meters = 16.093 kilometers (or 16.1 if rounded to 1 decimal place)

Metric System

- These prefixes are based on powers of 10. What does this mean?
 - From each prefix every “step” is either:
 - 10 times larger
 - or
 - 10 times smaller
 - For example
 - Centimeters are 10 times larger than millimeters
 - 1 centimeter = 10 millimeters

kilo	hecto	deca	<u>Base Units</u> meter gram liter	deci	centi	milli
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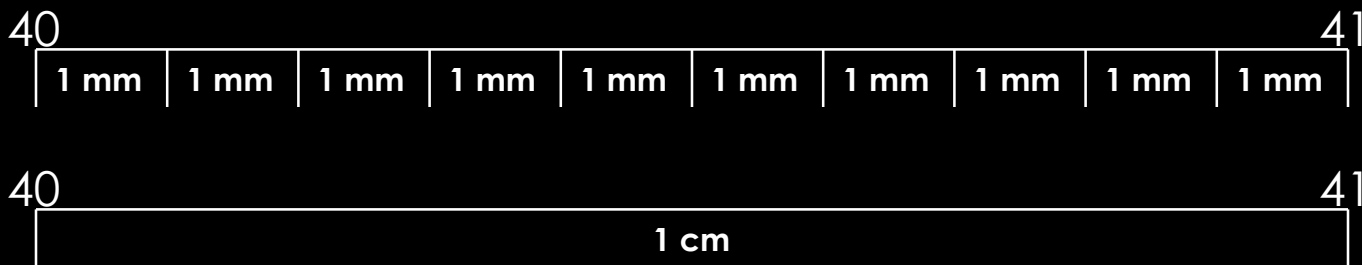
Metric System



- Centimeters are 10 times larger than millimeters so it takes **more** millimeters for the same length

1 centimeter = 10 millimeters

Example not to scale



Metric System

- For each “step” to right,
you are multiplying by 10
- For example, let’s go from a base unit to centi

$$1 \text{ liter} = 10 \text{ deciliters} = 100 \text{ centiliters}$$
$$(1 \times 10 = 10) \quad = \quad (10 \times 10 = 100)$$

$$2 \text{ grams} = 20 \text{ decigrams} = 200 \text{ centigrams}$$
$$(2 \times 10 = 20) \quad = \quad (20 \times 10 = 200)$$

kilo	hecto	deca	meter liter gram	deci	centi	milli
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Metric System

- An easy way to move within the metric system is by moving the decimal point one place for each “step” desired

Example: change meters to centimeters

1 meter = 10 decimeters = 100 centimeters

or

1.00 meter = 10.0 decimeters = 100. centimeters

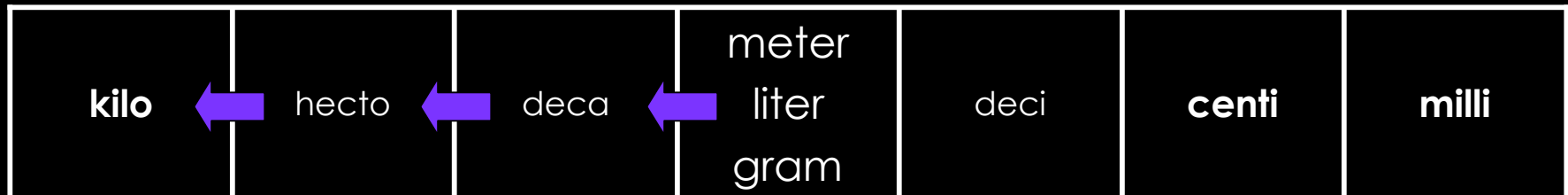
kilo	hecto	deca	meter liter gram	→	deci	→	centi	milli
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Metric System

- Now let's try our previous example from meters to kilometers:

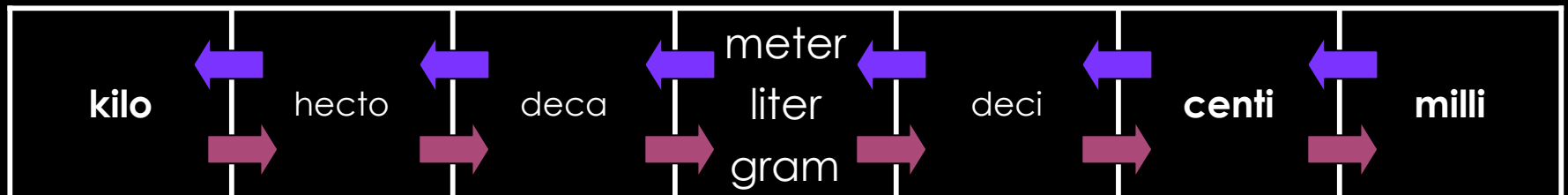
16093 meters = 1609.3 decameters = 160.93 hectometers = 16.093 kilometers

- So for every “step” from the base unit to kilo, we moved the decimal 1 place to the left (the same direction as in the diagram below)



Metric System

- If you move to the **left** in the diagram, move the decimal to the **left**
- If you move to the **right** in the diagram, move the decimal to the **right**

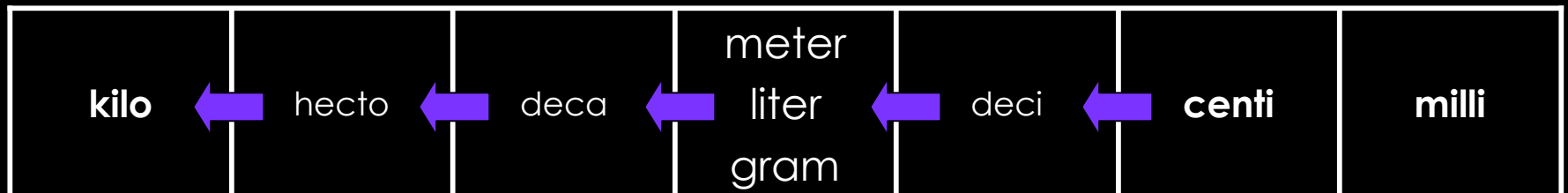


Metric System

- Now let's start from centimeters and convert to kilometers

400000 centimeters = 4 kilometers

400000 centimeters = 4.00000 kilometers



Metric System

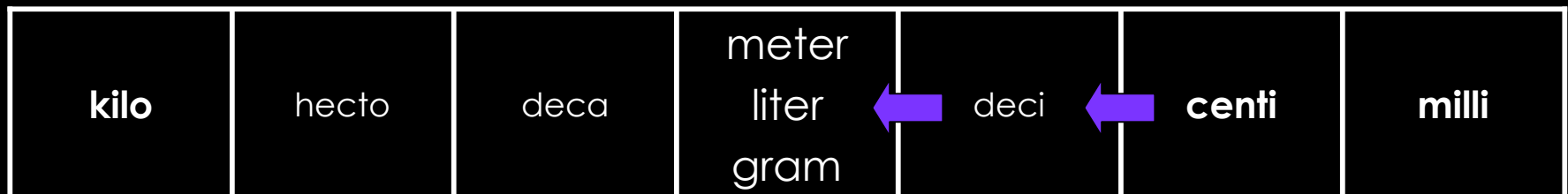
- Now let's start from meters and convert to kilometers

4000 meters = 4 kilometers



- Now let's start from centimeters and convert to meters

4000 centimeters = 40 meters



Metric System

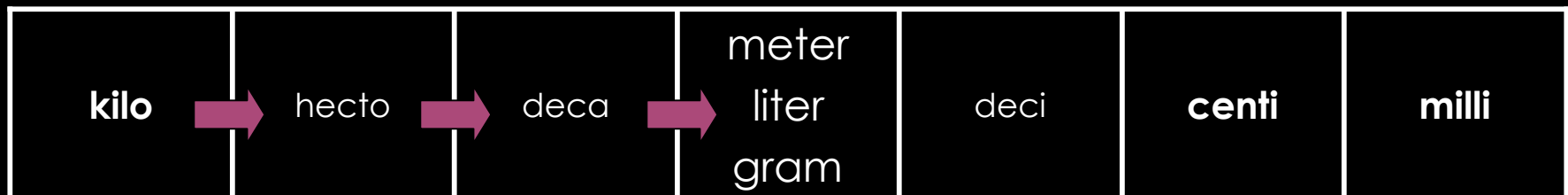
- Now let's start from meters and convert to centimeters

5 meters = 500 centimeters



- Now let's start from kilometers and convert to meters

.3 kilometers = 300 meters



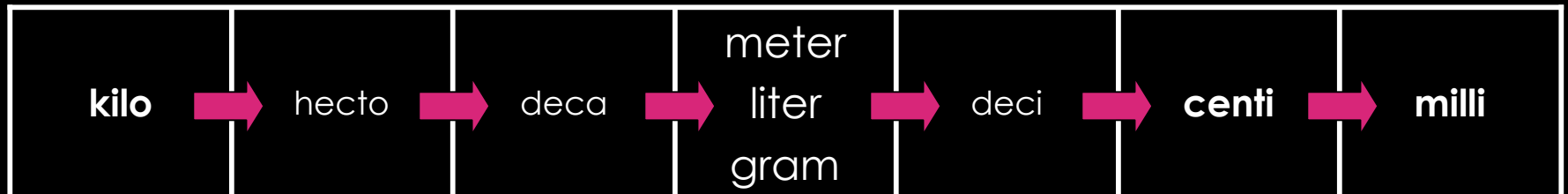
Metric System

- Now let's start from kilometers and convert to millimeters

4 kilometers = 4000000 millimeters

or

4 kilometers = 40 hectometers = 400 decameters
= 4000 meters = 40000 decimeters
= 400000 centimeters = 4000000 millimeters



Metric System

- Summary
 - Base units in the metric system are meter, liter, gram
 - Metric system is based on powers of 10
 - For conversions within the metric system, each “step” is 1 decimal place to the right or left
 - Using the diagram below, converting to the right, moves the decimal to the right and vice versa

kilo	hecto	deca	meter liter gram	deci	centi	milli
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